Instructor Resources

Phylogenetics, Race, and Ancestry Project | Module Title

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Description

Students are provided images of humans with different heritages and a template for a phylogenetic tree. Students are then asked to place the photos on a phylogenetic tree at the correct branch locations. Students will then compare their trees to a genetically determined tree and assess the differences. Students will discuss phylogenetics based on morphology vs genetics, and how this relates to the concepts of race (social construct) and ancestry (biological construct). They will then discuss the implications of these terms and our understanding of how they impact their lives.

Learning Goals

- 1. Students will understand the difference between social and biological constructs.
- 2. Students will understand the basic concepts of phylogenetics.
- 3. Students will understand the impacts of social constructs on society.

Learning Objectives

- 1. Students will able to compare and contrast morphological and genetically based phylogenetic trees.
- Students will be able to predict phylogenetic trees based on trait tables.
 Students will be able to evaluate the
- Students will be able to evaluate the impacts of misinterpreting phylogenetic relationships based on social constructs.

Suggested Courses

Evolution, Introductory Biology, Genetics

Scientific Processing Skills:	Predicting outcomes, Making Analyzing outcomes, Communicating results
Pedagogical Approaches:	Collaborative work, Reflective writing, Interactive lecture
Bloom's Cognitive Levels:	Foundational, Application and Analysis, Synthesis/Evaluation/Creation
Principles of how people learn:	Develops supportive community of learners, Leverages differences among learners, Requires students to do the bulk of the work
Vision and Change Competencies:	Ability to understand the relationship between science and society
Core Biological Concepts Covered:	Biogeography, Phylogenetics, Ancestry, Evolution, Eugenics

Additional Resources

Thurber, A., Harbin, M.B., & Bandy, J. (2019). Teaching Race: Pedagogy and Practice. Vanderbilt University Center for Teaching. Retrieved from https://cft.vanderbilt.edu/teaching-race/.

Gay, G., & Howard, T. C. (2000). Multicultural teacher education for the 21st century. The Teacher Educator, 36(1), 1–16. https://doi.org/10.1080/08878730009555246

Nelson, S. C., Yu, J.-H., Wagner, J. K., Harrell, T. M., Royal, C. D., & Bamshad, M. J. (2018). A content analysis of the views of genetics professionals on race, ancestry, and genetics. AJOB Empirical Bioethics, 9(4), 222–234. https://doi.org/10.1080/23294515.2018.1544177

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Adaptations

Instructors may choose to have students complete the activity over a period of two days, where they complete the bird phylogeny the first day, and the human phylogeny the second day. As currently written, the class goes through the bird phylogeny as part of the introductory lecture alongside the instructor.

Additionally, instructors may choose to print out the human photographs for students to use as flashcards for placing on the phylogenetic tree prior to class.

The phylogenetic tree can be truncated or expanded based on the complexity and prior knowledge of your course.

Self-assessment evaluation questions can be completed as a group discussion to facilitate understanding of responses, or by students outside of the classroom. If you choose to complete the questions outside of the classroom, it is highly encouraged that you return to the activity the following class period to have a "wrap-up" of the materials. This ensures that all of the students understood the assignment and the outcomes, and to ensure that no student feels as though the activity supports racial profiling.

Implementation Guide

Introductory Slides: Slides 1- 12	~15 minutes; This is assuming you choose to do the example trait table and tree as a class prior to the activity.
Building their tree: Slides 13- 14	~10 minutes; Students will build their trait table and phylogenetic tree in small groups using the photos provided
Activity Discussion: Slides 15-16	~10 minutes; Discuss the tree based on genetics. Explain the origin of humans and the concept of biogeography.
Activity Assessment (optional):	~15-30 minutes; Students answer the question set at the end of the activity. Depending on class time available/devoted to this activity, this can be done during the initial class period, during a second class period, or as homework. If needed, other sections of the timeline can be shortened to accommodate this part of the activity.
Wrap-up Discussion: Slide 17	~5 minutes; Go over the questions to be answered by students (this can be done in class or given as homework). Answer any remaining questions and reiterate the point of the activity for clarity.

Student Assessment

- 1. Students may turn in their predictive phylogenetic trees for a grade alongside their assessment questions.
- 2. Students may exclusively turn in their assessment questions for a grade.
- 3. Instructors may assign participation credit based on group discussion and interaction throughout the class period.

Phylogenetics, Race, and Ancestry

Name: Date:

Notes:

1. Follow along with your instructor to use these birds to build a trait table.



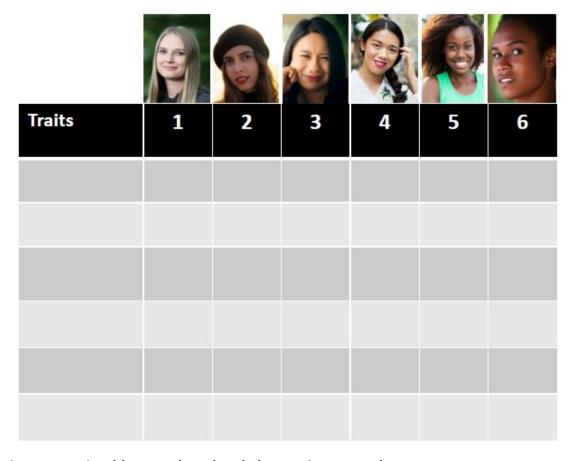
Traits	1	2	3	4
Beak shape				
Feather color				
Feather crest				
Body size				

2. Now, watch closely as we use the trait table to build a phylogenetic tree!

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3. Now, complete the trait table with a new set of images!



4. Using your trait table, complete the phylogenetic tree on the next page. You may cut out these images to place them on the tree, or use the numbering system to assign them to locations.













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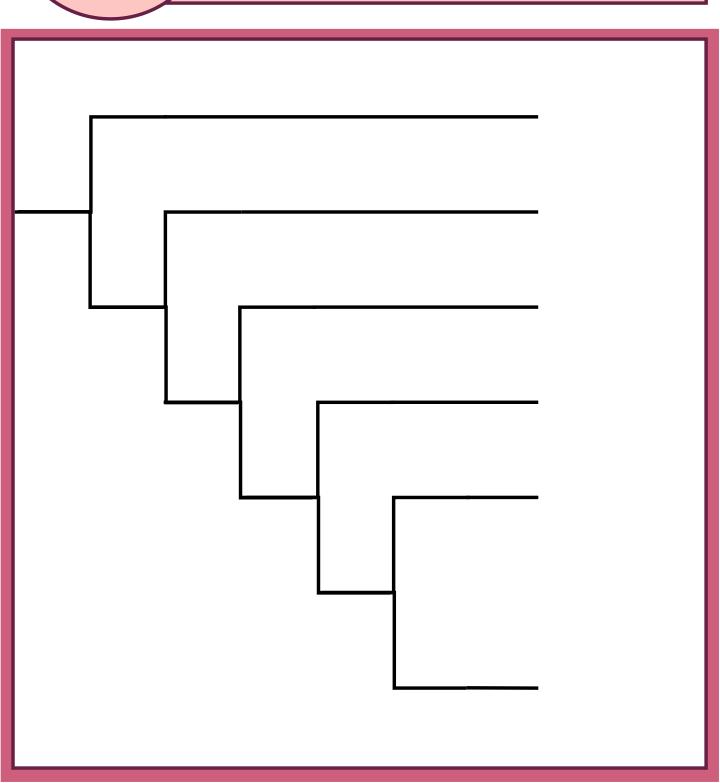
4

5

6

Phylogenetics, Race, and Ancestry

Name: Date:



Phylogenetics, Race, and Ancestry

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5. What characteristics did you use to build your phylogenetic tree?
6. Why did you choose those characteristics to build your phylogenetic tree?
7. In what ways does your tree differ from the tree built on genetic sequences?
8. What does this say about relying on morphological traits to build phylogenetic trees?

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- 9. How do you define race, ethnicity, and ancestry? How do they differ? 10. How does today's activity relate to race and ancestry? 11. Do you think you can determine the ancestry of someone by their skin color? Why or why not? 12. What does this activity tell you about the consequences of visual assumptions when
- implemented as a society? Give a specific example.